

RIVERS AND FLOODS, MARCH, 1911.

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The only floods of consequence in the larger rivers were those in the Sacramento and San Joaquin rivers of California. There were general and heavy rains over their watersheds during the first decade of the month, and these, combined with the melting snows in the foothills of the Sierras, caused floods that were disastrous in many places. Warnings were first issued on March 5, and again on March 6 and 7. Some of the crest stages reported along the Sacramento River were as follows: Red Bluff, 25.5 feet, 2.5 feet above the flood stage, on March 7; Colusa, 27.4 feet, 0.6 foot below the flood stage, on March 9; Sacramento, 25.2 feet, 3.8 feet below the flood stage, on March 12; Rio Vista, 9.7 feet, 2.3 feet below the flood stage, on March 14. At Lathrop, on the San Joaquin River, the crest stage was 18.8 feet, 1.8 feet above the flood stage, on March 10 and 13, and at Bellota, on Mormon Slough, 19 feet, 1 foot below the flood stage, on March 7.

Nearly all of the lands that had been overflowed by the floods of January and February, 1911, were again flooded, and during the afternoon of March 8 a large section of the levee opposite Colusa gave way, with the result that 15,000 acres of land were flooded. Warnings had previously been given to remove stock to places of safety, but several thousand head of sheep, mostly spring lambs that were too weak to be driven to higher ground, were drowned. By March 11 some of the back levees of the Colusa Basin broke, and about 9,000 acres of seeded lands were flooded. This land will not be available for another seeding this year. By March 15 conditions were again about normal.

The value of property destroyed by the floods was about as follows:

Property, excluding crops.....	\$105,000
Crops.....	25,000
Damage to farm lands.....	10,000
Suspension of business.....	20,000
Total.....	160,000

Value of property saved through Weather Bureau warnings about \$135,000.

Great damage was also done by the smaller streams in the State of California, and it is said that the losses over the southern portion amounted to more than \$1,000,000, of which more than one-half fell upon the farmers.

There were moderate floods in the Verde and Salt rivers of Arizona, caused by heavy rains from March 3 to 5, inclusive, and on March 7 the Salt River at Tempe, Ariz., reached a stage of 6 feet, 1 foot above flood stage. Warnings were issued on March 6, and the damage done was trifling. During the period from March 3 to 25, inclusive, the drainage from the upper Salt River into the Roosevelt Lake elevated the water some 35 feet in that reservoir.

There were no other floods of consequence, except in the mountain streams of Kentucky and eastern Tennessee on March 7 and 8. These floods also caused decided rises

in the Cumberland and Tennessee rivers, and in the Ohio River below the mouth of the Great Kanawha River, but not nearly to flood stages.

The upper Mississippi River was low during the month, but in the lower river good stages of water prevailed. Stages in the Missouri River were moderate.

ICE.

At the end of the month the rivers were generally free from ice except those of northern New England, which remained frozen. At Wolf Point, Mont., on the Missouri River, the ice went out on March 21; at Bismarck, N. Dak., on March 27; at Pierre, S. Dak., on March 14; at Chamberlain, S. Dak., on March 28; at Running Water, S. Dak., on March 8; and at Blair and Omaha, Nebr., on March 2. At Huron, S. Dak., the James River opened on March 6. The Mississippi River at Fort Ripley, Minn., was clear after March 20; at St. Paul, Minn., after March 3; at Red Wing, Minn., after March 7; at Prairie du Chien, Wis., after March 10; and at La Crosse, Wis., after March 8. Navigation on the Connecticut River at Hartford, Conn., was resumed on March 14, and on March 16 the river was free from ice. On the Hudson River navigation was resumed on March 20, the ice having moved out without damage several days before.

MOUNTAIN SNOWFALL.

Taken as a whole, the prospects are very favorable for a good supply of water during the coming season, as will be seen from the following summaries compiled from the snowfall reports of the various section directors:

Washington.—The snowfall during the month was light, and the water supply will probably be less than usual, although increased storage facilities will compensate for some of the deficiency.

Oregon.—The snowfall was generally deficient, but the comparatively mild weather of January and February caused the snow to become very compact at the higher levels. No snow remained below the 3,000-foot level, but it is probable that the supply from the upper levels will furnish a good flow of water.

California.—Owing to the heavy snowfall of January and the first 10 days of March, the snow covering is deeper than for years, and indications point to a supply of water during the coming season sufficient for all needs.

Nevada.—The depth of the accumulated snowfall is rather greater than usual, and with normal weather conditions during April and May there will be an abundance of water for irrigation purposes.

Utah.—While there were good snows during the month, there will probably be less water than usual, but without decided shortage.

Idaho.—The month was the driest March on record. The supply of snow was greatly reduced, but that re-

maining is compact and will melt slowly, with prospects of an average water supply during the coming summer.

Montana.—The ground is well stored with moisture, and the snow in the high mountains did not diminish to any extent. Conditions are therefore very favorable for a good water supply.

Wyoming.—The snowfall was very light and high temperatures melted all of the snow on the plains and most of that in the foothills. The mountain snow, however, is solid, and the water supply will probably be ample until late summer.

Colorado.—The snowfall was below the average, with considerable melting. The remaining snow, however, is well packed, and prospects of a fair water supply are favorable.

New Mexico.—Little, if any, snow was added to the stored depth, but the soil is generally well supplied with moisture, and there are prospects of a favorable year.

Arizona.—The snowfall was greatly deficient except over the upper Gila watershed. Warm rains carried off much of the snow up to the 8,000-foot level, and at the end of the month the supply of water was fully 50 per cent greater than that available at the corresponding period of last year. Conditions are favorable for a good water supply during April, May, and June, and the Colorado River will probably be much higher during June, 1911, than in June, 1910.

Hydrographs for typical points on several principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.